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10 CFR 50.73

September 19, 2002

RHLTR: #02-0069

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Dresden Nuclear Power Station, Unit 3
Facility Operating License No. DPR-25
NRC Docket No. 50-249

Subject: Licensee Event Report 2002-002-00, "Reactor Scram due to Main Shaft Oil Pump Failure"

Enclosed is Licensee Event Report 2002-002-00, "Reactor Scram due to Main Shaft Oil Pump Failure," for the Dresden Nuclear Power Station. This event is being reported in accordance with 10 CFR 50.73(a)(2)(iv)(A), "Any event or condition that resulted in a manual or automatic actuation of any of the systems listed in paragraph (a)(2)(iv)(B)," reactor protection system (RPS) including reactor scram or reactor trip.

Immediate Corrective Actions include:

All degraded parts were replaced and the turbine oil reservoir and internals were cleaned and flushed.

Corrective actions include:

Revise Corporate Turbine Front Standard inspection procedure MA-AB-763-411 to include dismantle and inspection of extension tube. The insulated coupling splines will be disassembled for inspection during regular six-year Preventative Maintenance and the as-found and as-left megger verified. In addition, the front standard bearing clearance acceptance criteria will be specified in the procedure.

Monitor and trend the shaft voltage readings in the system-monitoring plan.

Revise procedure MA-AB-763-411 to include the inspection of front standard insulation kit per GE specification.

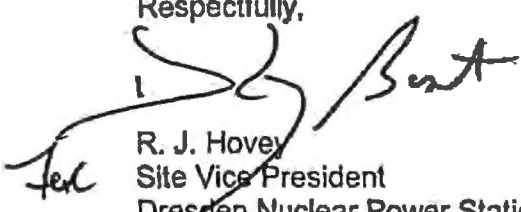
Revise corporate procedure WC-AA-112 to include a step that requires documentation of the specific technical basis for Preventive Maintenance deferrals and risk for the deferral.

IE22

Screen and sort the Preventive Maintenance deferral database by system for critical Preventive Maintenance deferrals and provide a list to system engineering for review.

If you have any questions, please contact Jeff Hansen, Regulatory Assurance Manager at (815) 416-2800.

Respectfully,


R. J. Hovey
Site Vice President
Dresden Nuclear Power Station

Enclosure

cc: Regional Administrator – NRC Region III
NRC Senior Resident Inspector – Dresden Nuclear Power Station

Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOF-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

1. FACILITY NAME Dresden Nuclear Power Station Unit 3						2. DOCKET NUMBER 05000249			3. PAGE 1 of 4		
4. TITLE Reactor Scram due to Main Shaft Oil Pump Failure											
5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED		
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER	
07	21	2002	2002	002	00	09	19	2002	N/A	N/A	
9. OPERATING MODE 1			11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check all that apply)								
10. POWER LEVEL 100			20.2201(b)			20.2203(a)(3)(ii)			50.73(a)(2)(i)(B)		
			20.2201(d)			20.2203(a)(4)			50.73(a)(2)(ii)		
			20.2203(a)(1)			50.36(c)(1)(i)(A)			X 50.73(a)(2)(iv)(A)		
			20.2203(a)(2)(i)			50.36(c)(1)(ii)(A)			50.73(a)(2)(v)(A)		
			20.2203(a)(2)(ii)			50.36(c)(2)			50.73(a)(2)(v)(B)		
			20.2203(a)(2)(iii)			50.46(a)(3)(ii)			50.73(a)(2)(v)(C)		
			20.2203(a)(2)(iv)			50.73(a)(2)(i)(A)			50.73(a)(2)(v)(D)		
			20.2203(a)(2)(v)			50.73(a)(2)(i)(B)			50.73(a)(2)(vii)		
			20.2203(a)(2)(vi)			50.73(a)(2)(i)(C)			50.73(a)(2)(vii)(A)		
			20.2203(a)(3)(i)			50.73(a)(2)(ii)(A)			50.73(a)(2)(vii)(B)		
12. LICENSEE CONTACT FOR THIS LER											
NAME Timothy P. Heisterman						TELEPHONE NUMBER (Include Area Code) (815) 416-2815					
13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT											
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX		
X	TD	ISL	G080	Y							
14. SUPPLEMENTAL REPORT EXPECTED										15. EXPECTED SUBMISSION DATE	
YES (If yes, complete EXPECTED SUBMISSION DATE)					X NO					MONTH	DAY
										YEAR	

16. ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On July 21, 2002, at 2033 hours Dresden Nuclear Power Station received an automatic reactor scram as the result of the main turbine tripping. The turbine trip was due to low discharge pressure from the turbine shaft bearing oil pump. Previous to the scram, on July 15, 2002, the turbine was taken off-line following identification of damage to the Permanent Magnet Generator (PMG). Following inspection of the PMG, the unit was returned to service on July 16, 2002. On July 21, 2002, low discharge pressure from the turbine shaft bearing oil pump caused the Unit 3 turbine to trip and consequently, a reactor scram occurred. The cause was determined to be the degradation of the auxiliary control rotor gear coupling insulation, resulting in current flow through the gear shafts which caused electrolysis and accelerated wear of the bearings. The corrective actions include revising turbine front standard procedures to include dismantling and inspection of the extension tube, inspecting and meggering the insulated coupling splines, and inspecting the front standard insulation kit per General Electric specifications. At no time did this condition compromise the health and safety of the public. The failure of the Main Shaft Oil Pump (MSOP) resulted in low turbine oil pressure, which initiated a turbine trip and reactor scram as designed. All safety systems functioned as designed following the reactor trip.

NRC FORM 366A U.S. NUCLEAR REGULATORY COMMISSION (7-2001)		APPROVED BY OMB NO. 3150-0104 EXPIRES 07/31/2004	
LICENSEE EVENT REPORT (LER) TEXT CONTINUATION		Estimated burden per response to comply with this mandatory information collection request 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the Information and Records Management Branch (t-6 f33), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and to the Paperwork Reduction Project (3150-0104), Office Of Management And Budget, Washington, DC 20503. If an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.	
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		2002	002
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(If more space is required, use additional copies of NRC Form 366A)(17)

A. Plant Conditions Prior to Event:

Unit: 03	Event Date: 07-21-2002	Event Time: 2033 CDT
Reactor Mode: 1	Mode Name: Run	Power Level: 100 percent
Reactor Coolant System Pressure: 1000 psig		

B. Description of Event:

This event is being reported in accordance with 10 CFR 50.73(a)(2)(iv)(A), "Any event or condition that resulted in a manual or automatic actuation of any of the systems listed in paragraph (a)(2)(iv)(B)", reactor protection system (RPS) including reactor scram or reactor trip."

On July 15, 2002, at 03:00, Unit 3 turbine was taken off-line following identification of damage to the PMG at the turbine front standard. Following the controlled Unit 3 turbine shutdown, an inspection of the PMG was performed. With the turbine at rest, General Electric (GE) and Corporate turbine personnel reviewed clearance measurements and concluded that the shaft was centered, which indicates no bearing wear at the MSOP [TD] end of the shaft. Based on the measurements taken, the front standard was not disassembled for further inspection. The unit was restored with the PMG internal mechanisms removed, turbine speed was verified locally and no abnormalities were noted during acceleration to 1800 rpm. Inspection upon disassembly of the turbine front standard after the July 21, 2002, reactor scram revealed the bearing wear was at the ten and seven o'clock positions, which would not have been revealed when the turbine was at rest.

On July 21, 2002, at 2033 hours, the Unit 3 main turbine [TA] tripped due to low discharge pressure from the turbine shaft bearing oil pump, resulting in a Unit 3 reactor scram. An inspection identified extensive damage to the main shaft oil pump rotor and MSOP gears. The PMG shaft was found sheared. Additionally, the MSOP bearings indicated damage and severe wear. Severe wear was also visible on the main shaft rotor thrust bearing face. Further damage was noted on the MSOP wear ring and the shaft seal rings. The cause of this event was determined to be a degradation of the auxiliary control rotor gear coupling insulation, resulting in a current flow through the shaft which caused electrolysis and accelerated wear of the bearings.

A review of design information and GE recommendations was performed. Dresden had previously implemented GE Technical Information Letter (TIL) 973-3, which recommended the installation of an insulated coupling modification to electrically insulate the main shaft rotor gear assembly from the turbine-generator. The insulated coupling protects the gear teeth, journals, and bearings from electrical pitting damage. Also, a copper braided shaft grounding device had been installed to protect the main turbine bearings from electrolysis damage per GE TIL 893-2 and the shaft voltage measurements were taken per station procedures. A review of shaft voltage readings taken per station procedures revealed an increased trend of the shaft voltage levels. The voltages in the months preceding the event had been increasing from 25 VDC in April 2002 to as high as 100VDC in June 2002. The station procedure for measuring the main shaft voltage did not provide any acceptance criteria for the voltage reading taken, nor was there any trending of shaft voltages performed. Engineering personnel did not communicate the increase in the shaft voltage during the PMG failure and thus no action was taken. It was determined that there was degraded insulation at the coupling between the main shaft rotor and the quill shaft which led to electrolysis in the front standard components. Since the coupling insulation was determined to be degraded, the increase in main shaft voltage accelerated the rate of electrolysis to the front standard components. Frosting and pitting were found on the front standard bearings and gear teeth as a result of the electrolysis.

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(If more space is required, use additional copies of NRC Form 366A)(17)

A review of preventative maintenance history was conducted. The review determined that the front standard components were inspected in May 1993 during a forced outage. The review also determined that the six-year preventative maintenance activity for the Unit 3 front standard was deferred from the refueling outage conducted in September 2000 to the next outage, scheduled for October 2002. The documentation justifying the deferral of front standard inspection was determined to be inadequate.

With the degraded insulation, the high shaft voltage accelerated the rate of electrolysis to the front standard components, causing bearing wear, which resulted in the failure of gear mesh, causing the MSOP to stop. This resulted in the loss of MSOP discharge pressure and the subsequent automatic turbine trip and reactor scram. The main shaft rotor and MSOP rotor were replaced. The MSOP impeller was in good condition, and it was reused. All four bearings were replaced. The main shaft return oil feed nozzle was found mis-positioned and the quill shaft was found with carbonized oil, but otherwise was in good condition. The PMG was left out-of-service.

C. Cause of Event:

The cause of this event was degradation of the auxiliary control rotor gear coupling insulation, resulting in current flow through the gear shafts which caused electrolysis and accelerated wear of the bearings.
(NRC Cause Code X).

D. Safety Analysis:

At no time did this condition compromise the health and safety of the public. The failure of the MSOP resulted in low turbine oil pressure, which initiated a turbine trip and reactor scram as designed. All safety systems functioned as designed following the reactor trip.

E. Corrective Actions:

Immediate Corrective Actions include:

All degraded parts were replaced and the turbine oil reservoir and internals were cleaned and flushed.

Corrective Actions include:

Revise Corporate Turbine Front Standard Inspection procedure MA-AB-763-411 to include dismantle and inspection of extension tube. The insulated coupling splines will be disassembled for inspection during regular six-year Preventative Maintenance and the as-found and as-left megger verified. In addition, the front standard bearing clearance acceptance criteria will be specified in the procedure.

Monitor and trend the shaft voltage readings in the system-monitoring plan.

Revise procedure MA-AB-763-411 to include the inspection of front standard insulation kit per GE specification.

Revise corporate procedure WC-AA-112 to include a step that requires documentation of the specific technical basis for Preventive Maintenance deferrals and risk for the deferral.

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Screen and sort the Preventive Maintenance deferral database by system for critical Preventive Maintenance deferrals and provide a list to system engineering for review.

F. Previous Occurrences:

None

G. Component Failure Data:

N/A